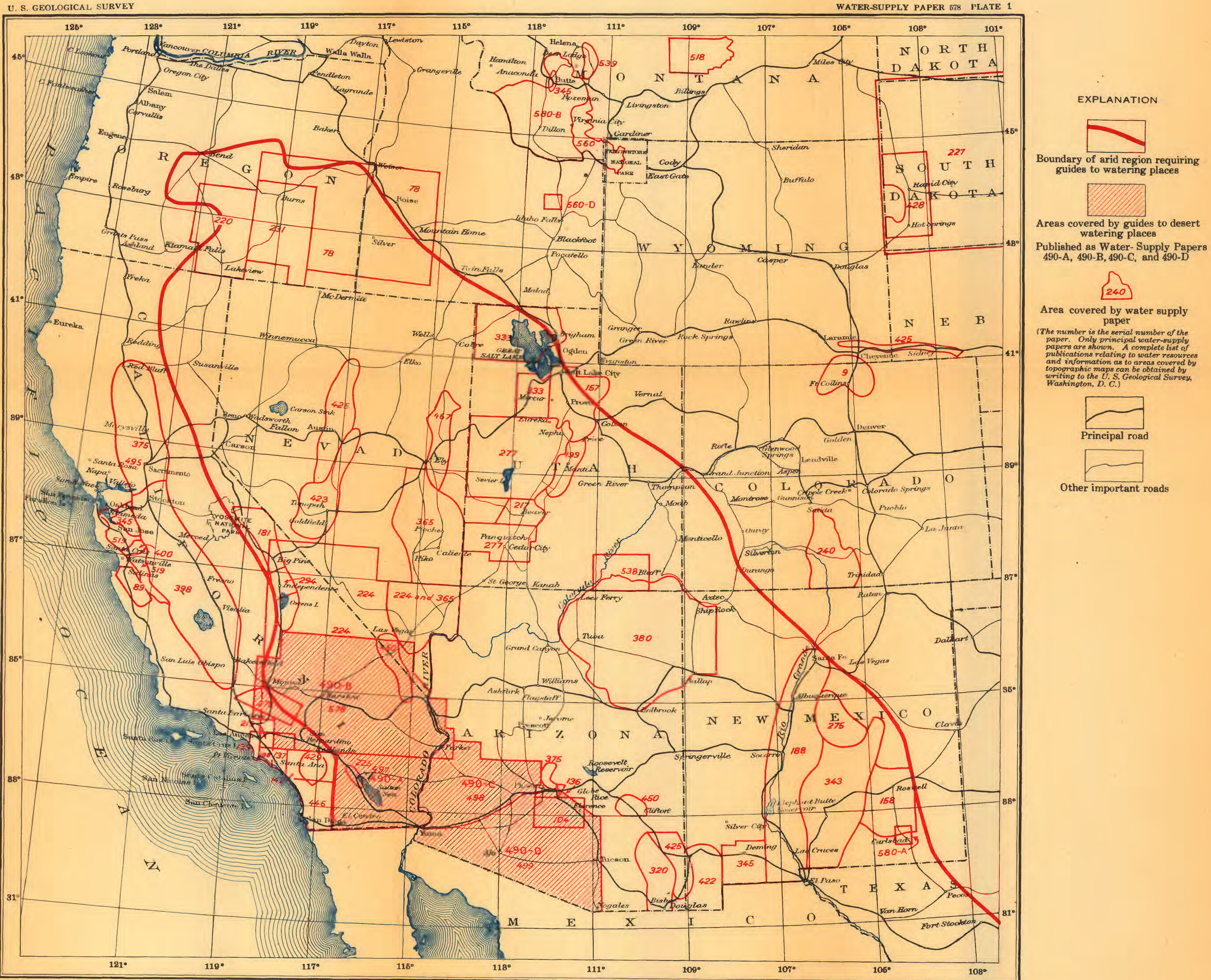



# MAP OF THE ARID REGION OF THE UNITED STATES

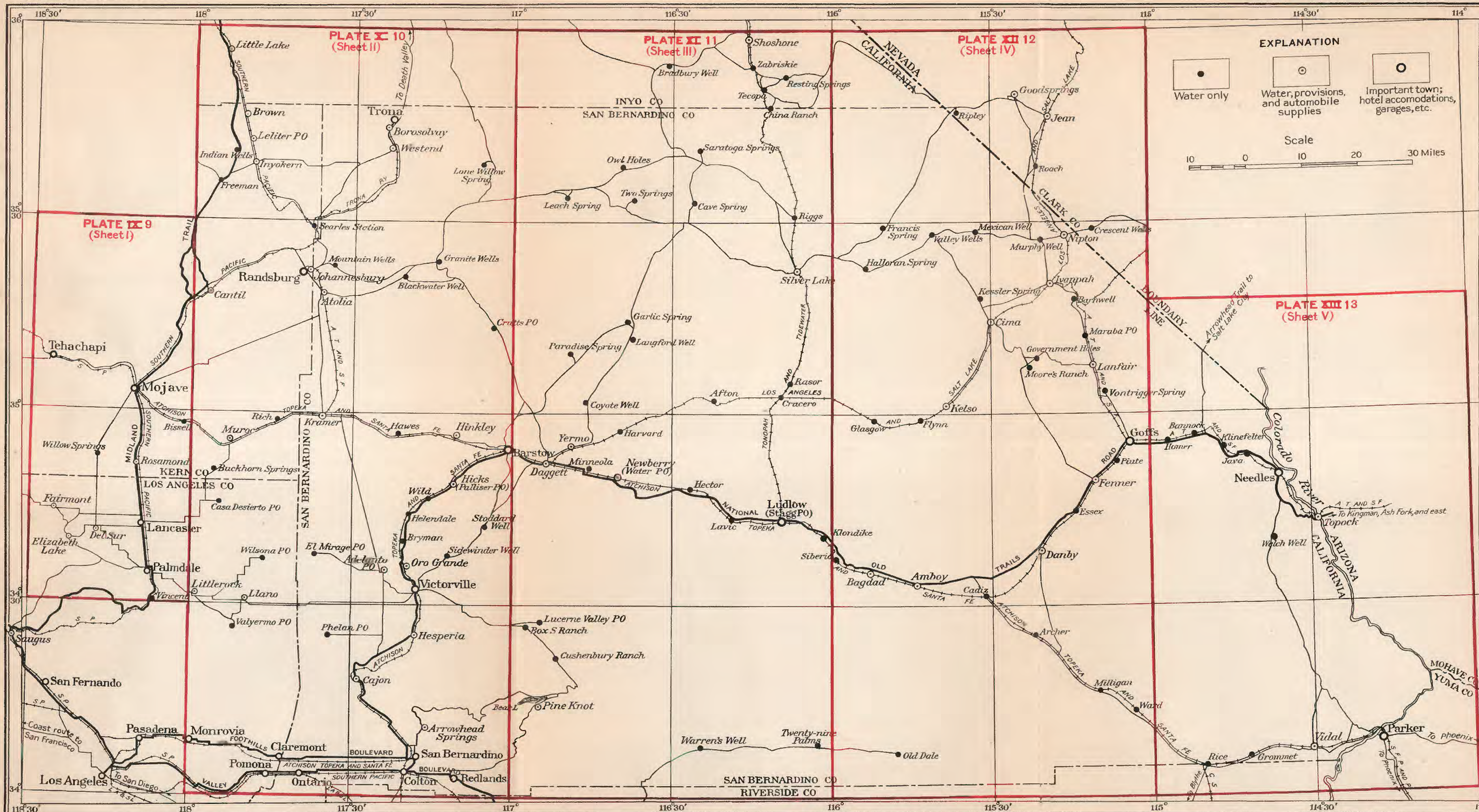
Showing area covered by guides to watering places and other water-supply papers of the U. S. Geological Survey

Compiled by O. E. Meinzer

Scale $\frac{1}{7,000,000}$

0 100 200 300 400 Miles

1929




INDEX MAP OF THE MOHAVE DESERT REGION, CALIFORNIA
SHOWING AREAS COVERED BY PLATES ~~IX-XIII~~ 9–13

ENGRAVED AND PRINTED BY THE U.S. GEOLOGICAL SURVEY

*A.* VIEW LOOKING NORTH UP WALL STREET CANYON IN CALICO MOUNTAINS

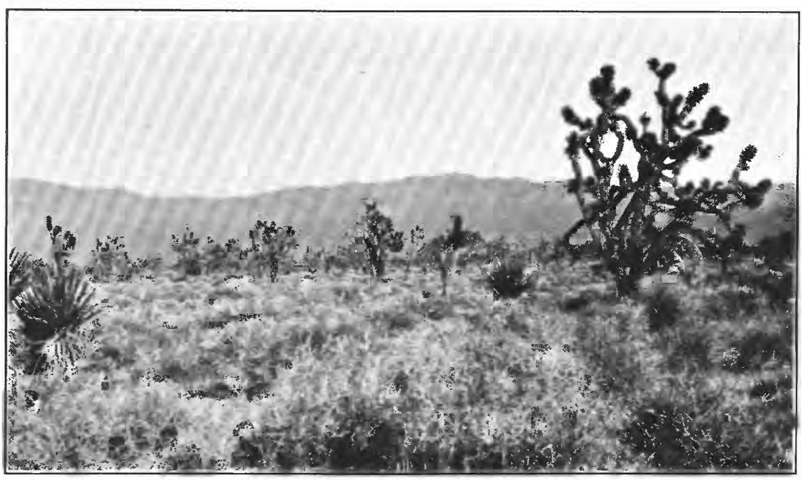
Shows remains of abandoned town of Calico

*B.* MESQUITE BUSH ON SAND DUNE ALONG MOHAVE RIVER

Shows how a single plant extends over a large area. Roots partly exposed

*A.* TYPICAL VIEW IN MOHAVE DESERT

Shows predominance of the creosote bush

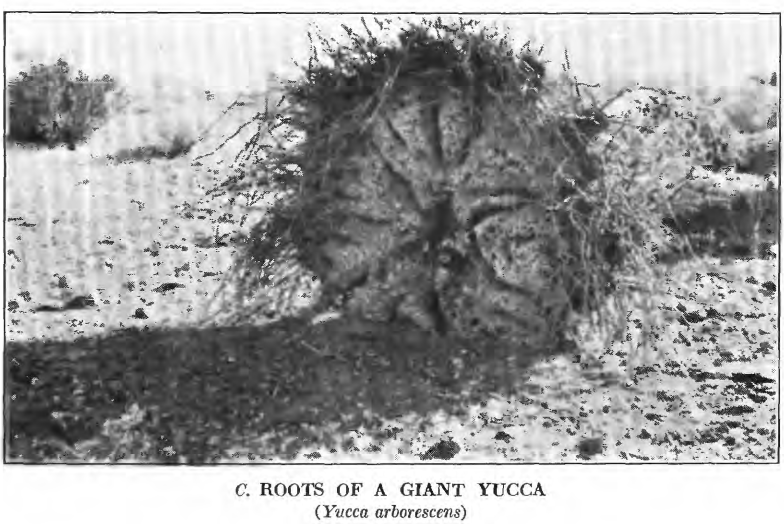


*B.* JOSHUA TREES, OR GIANT YUCCAS, NEAR CIMA

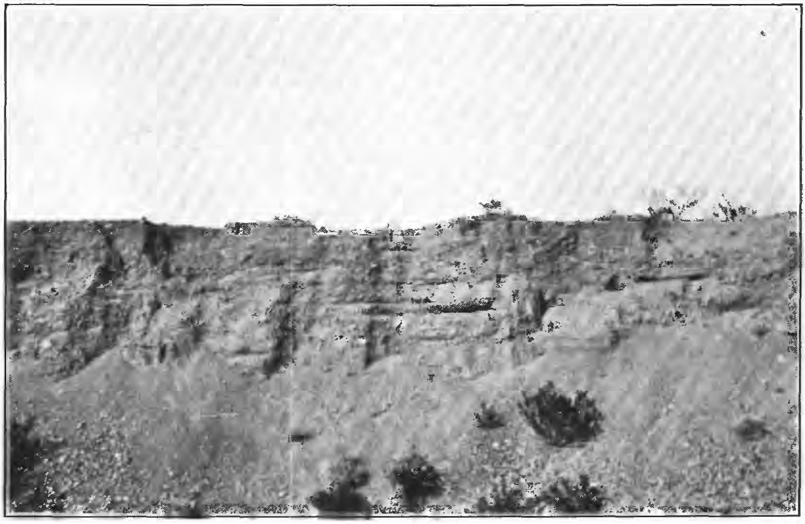
A characteristic desert plant that grows above the altitude of 2,500 feet. Photograph by G. A. Waring

*A.* ROOTS OF A CREOSOTE BUSH EXPOSED BY FLOOD WASH

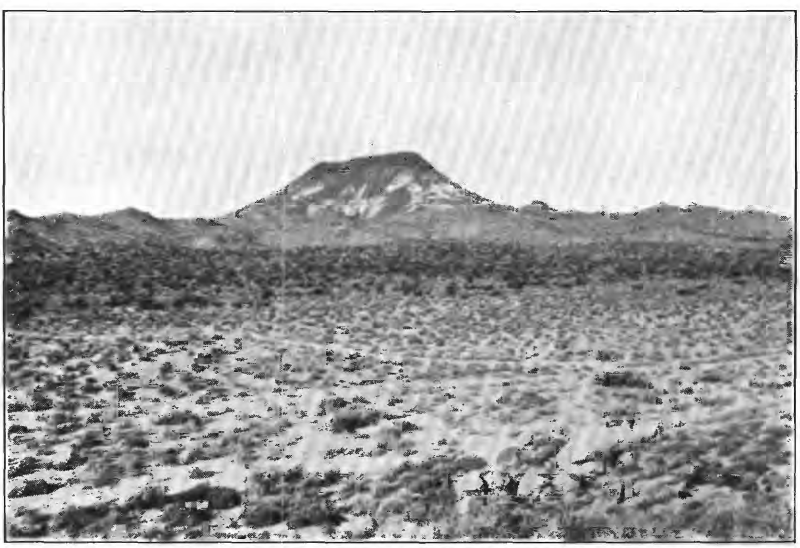
*B.* ROOTS OF A GIANT YUCCA
(*Yucca arborescens*)



*C.* ROOTS OF A GIANT YUCCA
(*Yucca arborescens*)



*A*. ALLUVIUM EXPOSED IN CUT ALONG ATCHISON, TOPEKA & SANTA FE RAILWAY 2½ MILES EAST OF DAGGETT



*B*. PILOT KNOB, IN T. 29 S., R. 44 E. MOUNT DIABLO MERIDIAN

Shows contact between Tertiary (?) volcanic rocks and older granite

*A.* LEACH SPRING AND PART OF GRANITE MOUNTAINS

Photograph by H. S. Gale

*B.* INDIAN SPRING, IN SUPERIOR VALLEY

*A*. SURFACE OF HARPER DRY LAKE

Shows ridge of alkali-covered "self-rising" ground and less alkaline smooth ground

*B*. WASTE FROM UNCAPPED WELL IN THE SE. ¼ SEC. 16, T. 7 N., R. 12 W., ANTELOPE VALLEY

## QUALITY OF WATER

Analyses of several samples of water are published in Water-Supply Paper 278 (p. 57), and analyses of 6 samples collected by the writer are given in the accompanying table. In addition, in Water-Supply Paper 278 (pp. 70–89) the total solids as determined by conductivity measurements are given for samples from 180 other wells. These analyses indicate that water suitable for domestic use and irrigation can be obtained from deep wells almost anywhere in the valley. All but two of the 12 waters analyzed are classed as either fair or good for domestic use, boilers, and irrigation. The total dissolved solids range from 158 to 766 parts per million, but only two samples contained more than 330 parts. The water which contained 766 parts per million (No. 69) was obtained from a shallow well only 15 feet deep, and alkali is abundant on the surface a short distance from the well. It is hard but not unsuitable for drinking or irrigation.

*Analyses of ground waters in Antelope Valley, Calif.*

[Parts per million]

| No. on pl. 19 [a] | Date of collection | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium and potassium (Na+K) | Carbonate radicle ($CO_3$) | Bicarbonate radicle ($HCO_3$) | Sulphate radicle ($SO_4$) | Chloride radicle (Cl) | Nitrate radicle ($NO_3$) | Total dissolved solids at 180° C. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6 | Dec. 13, 1917 | 27 | 0.21 | 6.1 | 1.9 | [b] 94 | 9.1 | 158 | 71 | 6.2 | 0.78 | 301 |
| 59 | Jan. 10, 1920 | 39 | .07 | 36 | 8.3 | [b] 27 | .0 | 150 | 9.5 | 16 | 33 | 255 |
| 65 | Jan. 10, 1920 | 35 | .06 | 46 | 11 | [b] 48 | .0 | 150 | 88 | 28 | 12 | 346 |
| 69 | Jan. 14, 1920 | 40 | .07 | 157 | 23 | 75 | .0 | 364 | 127 | 77 | 61 | 766 |
| 86 | Jan. 13, 1920 | 23 | .07 | 21 | 2.2 | [b] 29 | 1.7 | 107 | 19 | 10 | .50 | 158 |
| 148 | 1908 | 45 | .86 | 5.7 | 1.8 | 154 | 9.6 | 325 | 55 | 29 | .0 | 460 |
| 149 | 1908 | 52 | .84 | 5.1 | 6.2 | 102 | 19 | 196 | 54 | 65 | .64 | 330 |
| 150 | 1908 | 16 | .08 | 40 | 7.0 | 54 | .0 | 176 | 44 | 25 | 7.0 | 283 |
| 151 | 1908 | 39 | .05 | 36 | 12 | 41 | .0 | 146 | 31 | 18 | 30 | 267 |
| 152 | 1908 | 39 | .07 | 23 | 3.7 | 25 | 6.0 | 96 | 25 | 5.5 | 1.7 | 161 |
| ([c]) | 1908 | 25 | .25 | 44 | 9.1 | 54 | .0 | 155 | 101 | 19 | ------- | 312 |
| ([d]) | Dec. 13, 1917 | 46 | .06 | 9.3 | 1.7 | [b] 82 | .0 | 164 | 59 | 8.6 | .48 | 281 |

[a] For additional data see corresponding map number in table on pp. 348–363.
[b] Calculated.
[c] Not numbered on map. Willow Springs, sec. 11, T. 9 N., R. 14 W.
[d] Not numbered on map. Buckhorn Springs, sec. 27, T. 9 N., R. 10 W.

Analysts: No. 6 and Buckhorn Springs, A. T. Geiger; Nos. 59, 65, 69, and 86, M. D. Foster; Nos. 148–152 and Willow Springs, Walton Van Winkle.

Of the 185 samples from wells listed in Water-Supply Paper 278 only 19 contained more than 300 parts per million of total solids and only 2 contained more than 500 parts per million. In general, the water obtained from shallow wells is more highly mineralized than that from deeper wells. This is especially true in the area of artesian flow, where the water table is so close to the surface that more or less alkali has been deposited at and near the surface as the result of evaporation. The concentration of alkali in the soil may extend down a number of feet, or surface water containing alkali may seep into the well. The water from deep wells near and on the playas is nearly as good as that from wells some distance from them, despite the presence of alkali at the surface. Water that contained only 301 parts per million of solids was obtained at a depth of less than 150 feet in a well (No. 6) drilled as a test for potash near the center of sec. 20, T. 9 N., R. 9 W., on Rogers Dry Lake. This drilling did not penetrate any beds of salt or gypsum.

### WELL CONSTRUCTION

Drilling in Antelope Valley is done by the hydraulic rotary and the mud-scow or California methods.

In the fine deposits that underlie the lower parts of the alluvial slopes the hydraulic rotary method is commonly used. The hole is not cased until it is drilled the entire depth or until the diameter is reduced. To prevent caving before the casing is inserted the water that is forced into the hole is laden with mud, which fills the porous alluvium and acts as a lining. Unperforated casing is usually inserted to a depth of 50 feet or more, and perforated casing of small diameter in the rest of the well. The casing is perforated before it is inserted.

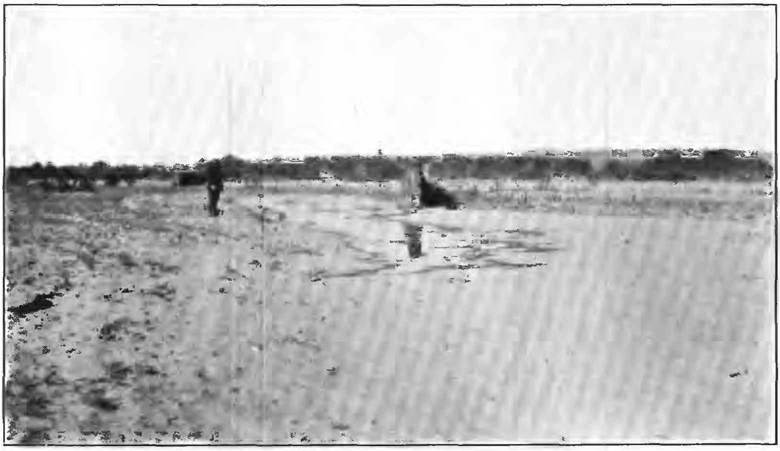
In the coarse bouldery deposits that underlie the upper parts of the alluvial slope the mud-scow method is used. A sand bucket or mud scow, consisting of a long iron pipe with a sharpened edge, is commonly used for both loosening and removing the material, but if large boulders are encountered the drilling may be done with a heavy iron bit. To prevent caving the casing must be driven down as the hole progresses and is perforated after it is inserted in the well. It may be perforated throughout, but usually it is perforated only where good supplies of water were struck when the hole was drilled. If because of inaccurate measurements the casing is perforated a little too high or too low, the water supply may be much less than if the measurements were carefully made.

If the water is under artesian pressure and the casing is perforated for most of its length, the pressure at different horizons may be different and the water from one bed may be forced into another. In several wells 500 to 600 feet deep the water level stood 5 to 15 feet or more above the level of the water in wells only half as deep.

Most of the wells that were drilled during the early development of the valley were only 6 or 8 inches in diameter. In recent years most of them have been 10 or 12 inches, and a few as large as 16 inches. One reason for the larger wells has been the increase in the use of deep-well turbine pumps.

### PUMPING PLANTS

Three general types of pumps are used in Antelope Valley. In the upper parts of the alluvial slopes, where the lift is great, reciprocating or cylinder pumps are much used. They are especially adapted



*A.* MOHAVE RIVER 1,000 FEET ABOVE BARSTOW WAGON BRIDGE, NOVEMBER 30, 1919

Since 6 p. m. of the preceding evening the stream had advanced from a point near where the man is standing

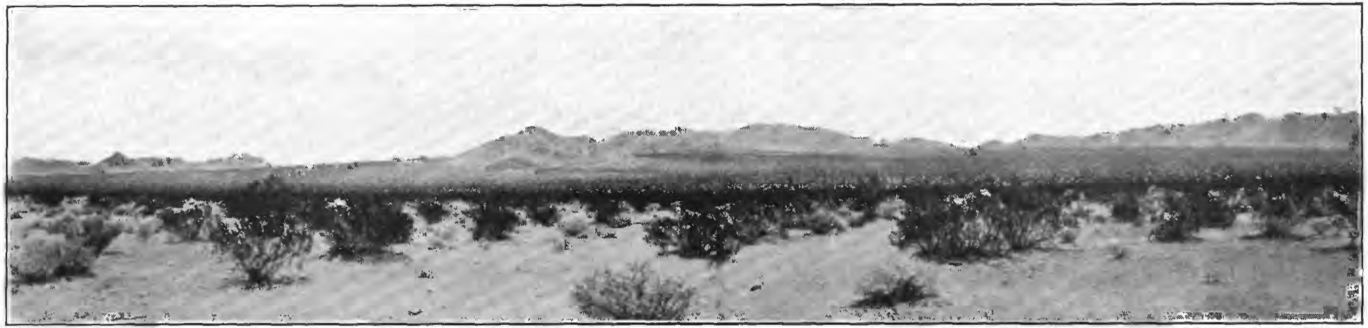
*B.* MOHAVE RIVER LOOKING UPSTREAM FROM BARSTOW WAGON BRIDGE, JANUARY 23, 1920

*A*. MOHAVE RIVER ABOUT HALF A MILE BELOW CAMP CADY, NOVEMBER 21, 1919

*B*. END OF STREAM IN CHANNEL OF MOHAVE RIVER ABOUT HALF A MILE BELOW POINT SHOWN IN *A*

*A.* VIEW LOOKING EAST AND SOUTHEAST ACROSS MOHAVE RIVER VALLEY AT VICTORVILLE

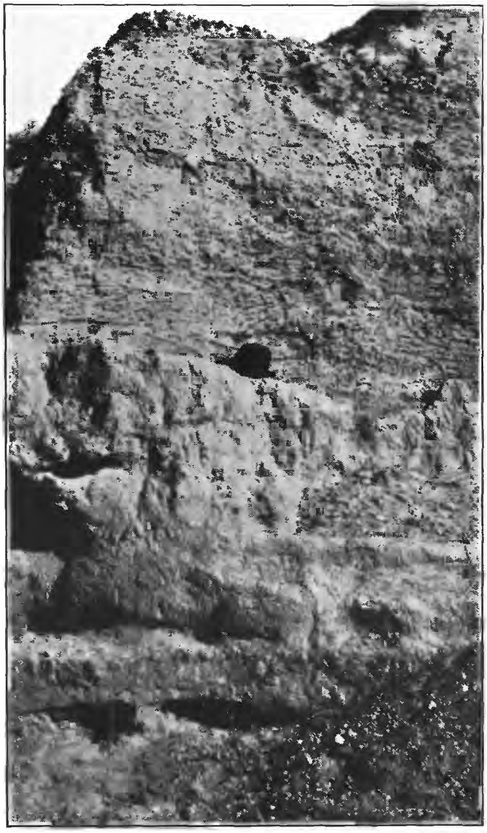
Upper Narrows at right and Sidewinder Wash at left. Photograph by G. A. Waring



*B.* ALLUVIAL SLOPE RISING TO THE GRANITE MOUNTAINS ON THE NORTH SIDE OF BICYCLE VALLEY

Photograph by G. A. Waring

*A.* STRATIFIED ALLUVIUM ALONG MOHAVE RIVER SOUTH OF YERMO



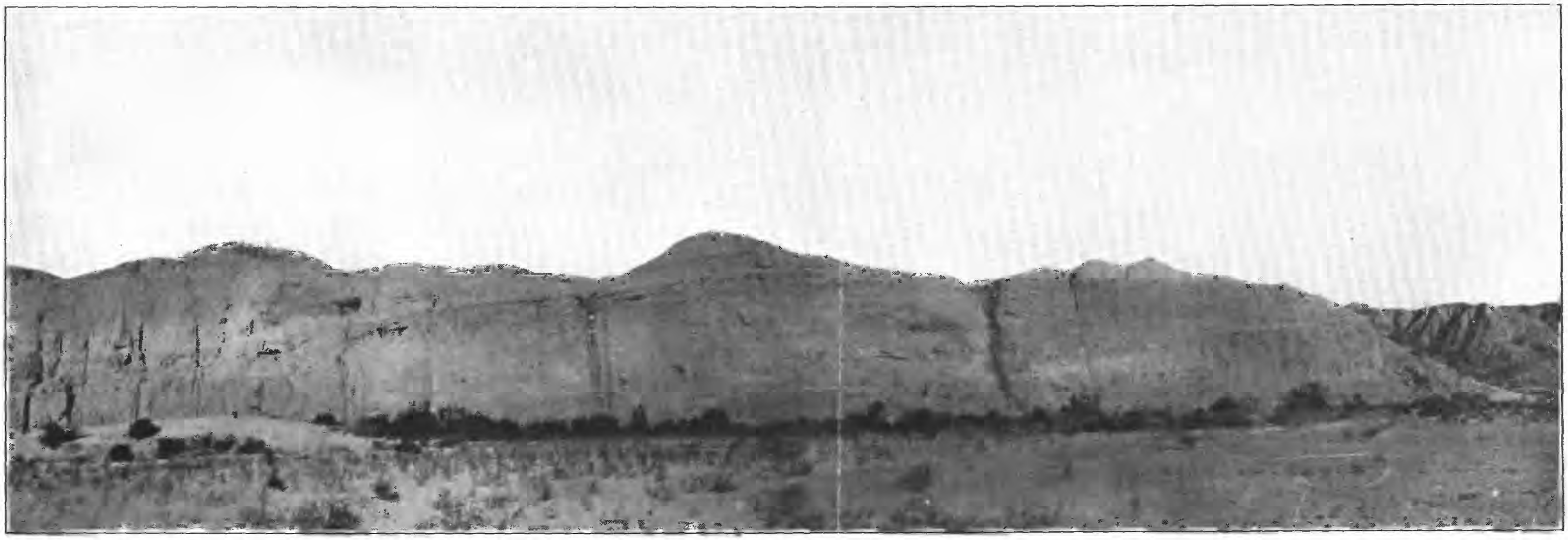
*B.* NEAR VIEW OF STRATIFIED ALLUVIUM SHOWN IN *A*

*A.* VIEW LOOKING EAST AND NORTH ACROSS MOHAVE RIVER ABOUT 2 MILES EAST OF OLD CAMP CADY

Shows alluvium at right, grading into greatly dissected Manix lake beds at left

*B.* SAND-DUNE BELT IN SOUTH-CENTRAL PART OF LOWER MOHAVE VALLEY

Viewed from Edwards ranch, in the NW. ¼ sec. 19, T. 9 N., R. 3 E. San Bernardino meridian. Looking east (at left), southeast, and south. The left border of the dune belt marks an abrupt drop in the water table

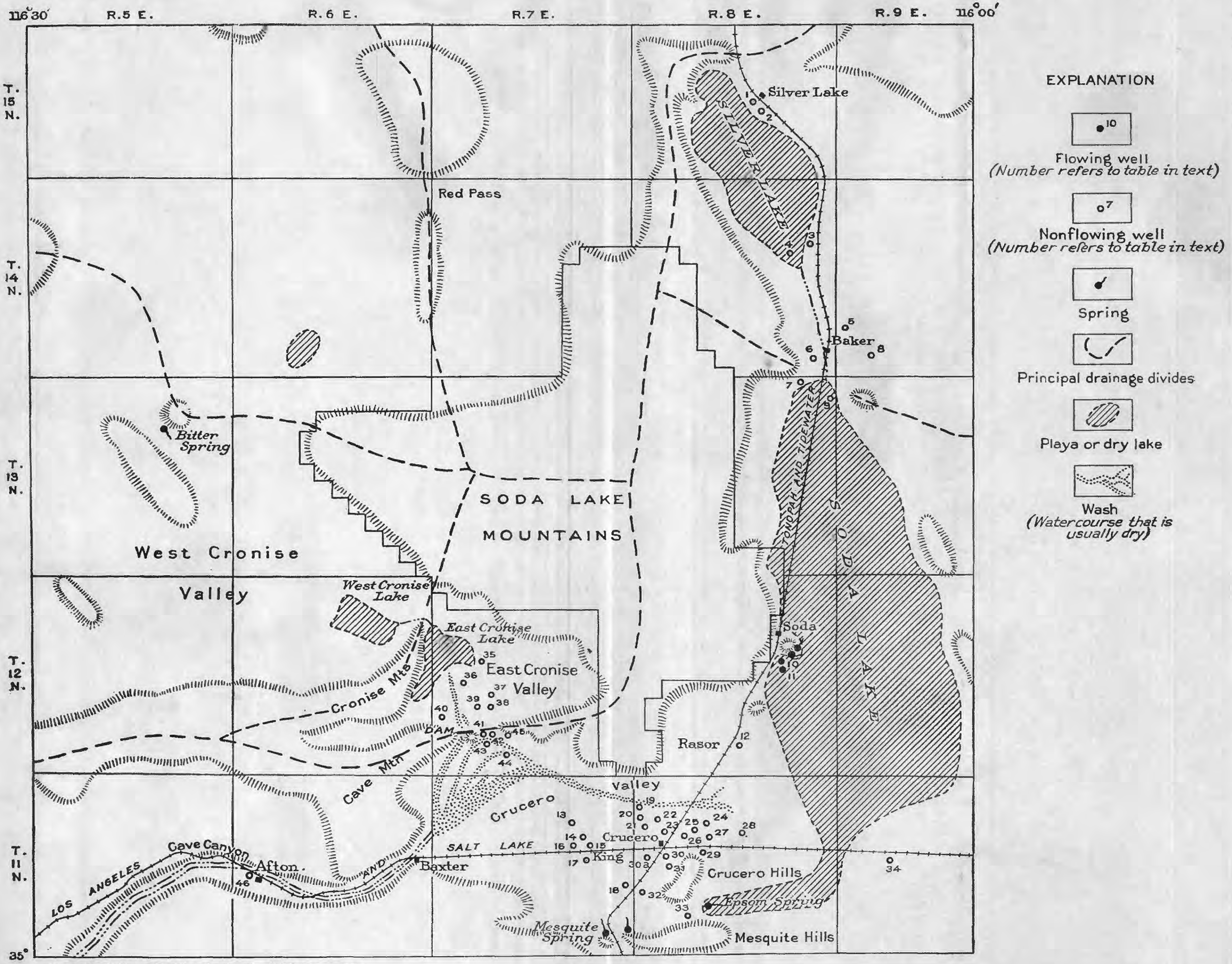


*A.* NEAR VIEW OF MANIX LAKE BEDS

Shows gradation of alluvium at right into lake beds at left. Lake beds at top in right side of view

*B.* TERRACES CUT IN MANIX LAKE BEDS ALONG MOHAVE RIVER 3 OR 4 MILES EAST OF CAMP CADY

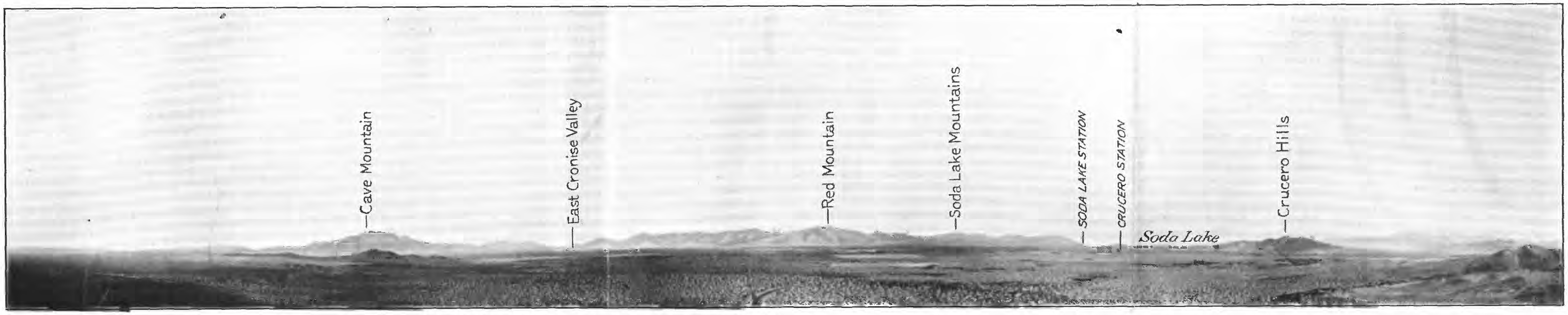
Manix Wash in left foreground




Compiled from field data by David G. Thompson, a map of Crucero and Cronise Valleys by H. O. Bradley, township plats of the General Land Office, railroad surveys, and other sources

0 5 10 Miles

MAP OF PARTS OF CRONISE, CRUCERO, SODA LAKE, AND SILVER LAKE VALLEYS SHOWING PHYSICAL FEATURES AND LOCATION OF SPRINGS AND WELLS

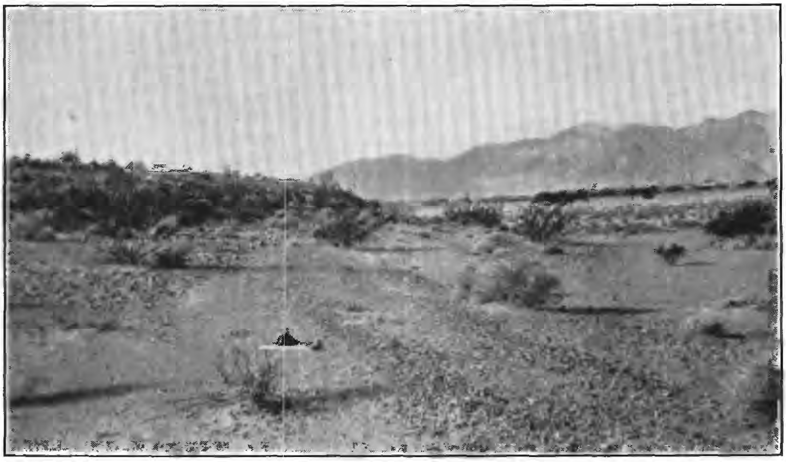



*A*. PANORAMIC VIEW OF CRUCERO VALLEY FROM HILLS AT MESQUITE SPRING, IN SEC. 25, T. 11 N., R. 7 E.

Looking west and northwest and northeast and east

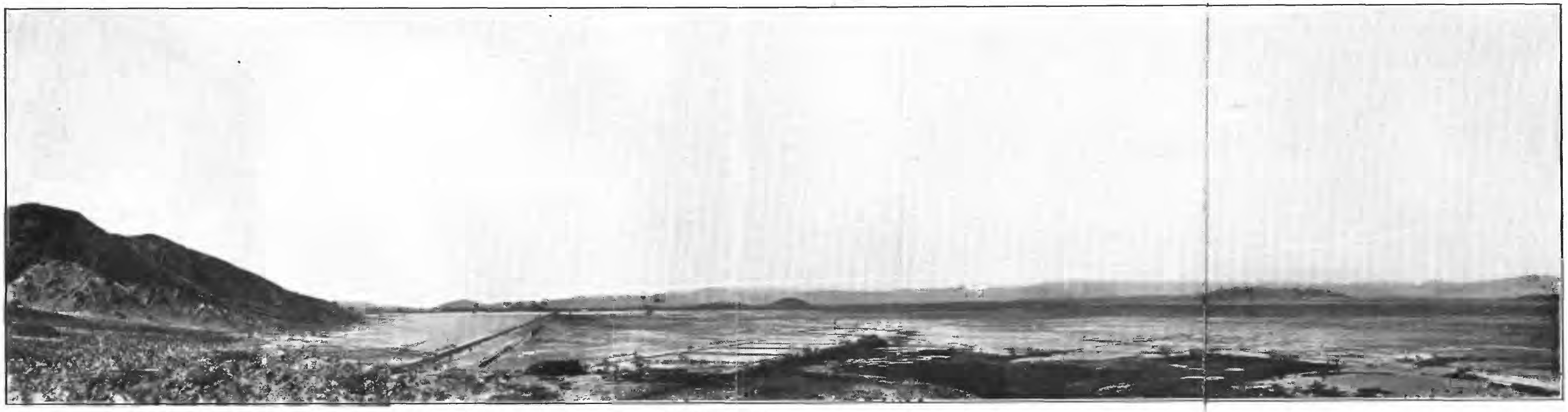

*B*. PANORAMIC VIEW OF CRUCERO VALLEY FROM HILLS IN SEC. 28, T. 12 N., R. 7 E.

Looking east, southeast, south, southwest, and west



*A.* WAVE-CUT CLIFF AND STRAND LINES IN THE SW. ¼ SEC. 20, T. 12 N., R. 7 E. SAN BERNARDINO MERIDIAN, EAST CRONISE VALLEY

*B.* THE MYSTIC MAZE, AN ANCIENT INDIAN CEREMONIAL GROUND 14 MILES SOUTHEAST OF NEEDLES



*A.* SODA LAKE, LOOKING NORTH AND EAST FROM HILL AT SODA STATION


*B.* SILVER LAKE, LOOKING SOUTHWEST, WEST, AND NORTH FROM HILL AT NORTHEAST EDGE OF PLAYA

Showing wave-cut cliffs at left, ancient beach, and outlet channel of Lake Mohave (marked ×). The dark smooth surface is not water but hard clay

*A.* MOUNT PISGAH CINDER CONE AND LAVA FLOW FROM THE NORTHWEST

Photograph by N. H. Darton

*B.* INTERIOR OF MOUNT PISGAH CINDER CONE

Photograph by N. H. Darton


# TOPOGRAPHIC MAP OF LANFAIR VALLEY AND VICINITY, SAN BERNARDINO COUNTY, CALIF.

Showing location of wells and springs

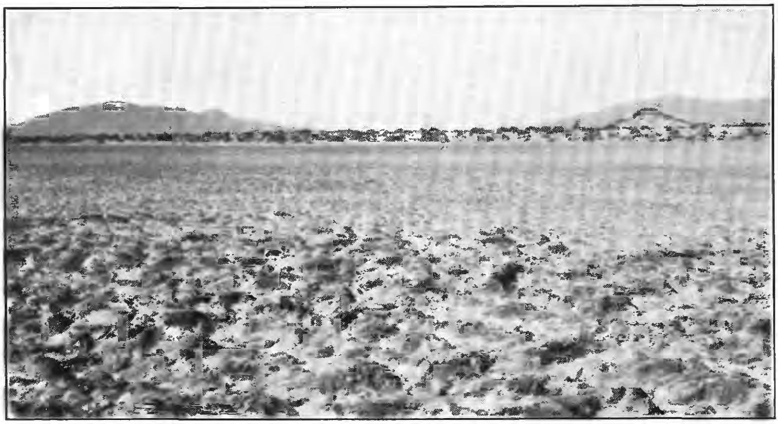
Part of U. S. G. S. topographic map of Ivanpah quadrangle

Scale $\frac{1}{250000}$

2 1 0 2 4 6 8 10 Miles

Contour interval 100 feet.

*Datum is mean sea level.*



*A*. "SELF-RISING GROUND" ON SURFACE OF CADIZ DRY LAKE

Looking northeast toward Ship Mountain at left. Photograph by L. F. Noble

*B*. VIEW LOOKING SOUTH ACROSS DANBY DRY LAKE FROM A POINT ON PARKER ROAD ABOUT A MILE WEST OF WARD

Shows small channels crossing the playa. Iron Mountain at right. Photograph by L. F. Noble

*C*. LARGE EROSION CHANNEL CUTTING SURFACE OF DANBY DRY LAKE